

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of controlling the level of reagent in a bubbler comprising:
providing a bubbler containing a quantity of reagent which is in fluid communication with a process tool;
providing a reservoir which contains a quantity of the reagent which is in fluid communication with the bubbler; providing a reservoir and a conduit which includes a valve and which provides communication between said reservoir and said bubbler;
producing a reagent-laden carrier gas by introducing a carrier gas into said bubbler to cause vapor of said reagent to become entrained in said carrier gas and to flow to said process tool; and
maintaining sufficient reagent within said bubbler by equilibrating the gaseous head pressure within said bubbler with that of said conduit communicating between said reservoir and said bubbler.
2. The method of claim 1, wherein levels of said reagent in said bubbler are maintained between limits which define a sufficient quantity of reagent, and wherein when said reagent level rises or drops to those levels, said valve is closed or opened to discontinue or to begin filling of said bubbler.
3. The method of claim 1, which also includes;
sensing deviations of said reagent level within said bubbler from a predetermined level; and in response to the sensed deviations of said reagent level from the predetermined level, causing a flow of said reagent between said bulk reagent supply and said bubbler to cause said reagent level to be restored to a predetermined level.
4. An apparatus for controlling the delivery of vapor to a process tool, said apparatus comprising:
a bubbler which contains a quantity of a reagent and which is in fluid communication with a process tool;
means for introducing a carrier gas into said bubbler to cause vapor of said reagent to become entrained in said carrier gas and to flow out of said bubbler to a process tool; and

control means for maintaining sufficient liquid within said bubbler.

5. The apparatus of claim 4, wherein said control means causes the concentration level of the delivered vapor to be substantially constant.

6. The apparatus of claim 4, further comprising a heating means for increasing the temperature of said reagent in said bubbler.

7. The apparatus of claim 4, which also includes a reservoir for holding a quantity of said reagent and a conduit which includes a valve and which provides liquid communication between said reservoir and said bubbler, and wherein said control means includes means for providing a gaseous head pressure within said bubbler.

8. The apparatus of claim 7, wherein levels of said reagent in said bubbler are set between limits which define a sufficient quantity of reagent are established, and wherein when said reagent levels rise or drop to said predetermined levels, said valve is closed or opened automatically to discontinue or to begin filling said bubbler until the head pressure with said bubbler equilibrates with the pressure of said conduit.

9. An apparatus for providing chemically reactive vapor to a processing tool, comprising:

a bubbler for containment of a reagent that is in communication with a reservoir containing said reagent, a carrier gas and a processing tool, wherein said bubbler comprises a carrier gas outlet, a liquid level set tube, a vapor extraction tube, and a drain placed in a low point of the bubbler floor, wherein the top of said liquid level set tube is positioned at a predetermined height to achieve a specific head pressure within said bubbler resulting in the surface of said reagent to be level with the top of said set tub and wherein said u-shaped vapor extraction tube having a first positioned above and horizontal to said reagent surface and said second end in communication with said processing tool.

10. An apparatus of claim 9, wherein said bubbler is in fluid communication with a reservoir containing a chemical reagent.